

# PROCEEDINGS

OF

## THE ROYAL SOCIETY.

*March 1, 1877.*

Dr. J. DALTON HOOKER, C.B., President, in the Chair.

The Presents received were laid on the table, and thanks ordered for them.

In pursuance of the Statutes, the names of the Candidates for election into the Society were read, as follows:—

|                                          |                                                      |
|------------------------------------------|------------------------------------------------------|
| John Anderson, M.D., F.R.S.E.,<br>F.L.S. | Henry Haversham Godwin-Austen,<br>Major.             |
| John Attfeld, Ph.D., F.C.S.              | Rev. William Greenwell, M.A.,<br>F.S.A.              |
| Francis Maitland Balfour, F.L.S.         | George Griffith, M.A.                                |
| Charles Barry, Pres. R.I.B.A.            | Brian Haughton Hodgson, F.L.S.                       |
| Prof. Robert Bentley, F.L.S.             | John Hopkinson, M.A., D.Sc.                          |
| Walter Lawry Buller, Sc.D., F.L.S.       | John Hughlings Jackson, M.D.,<br>F.R.C.S.            |
| George Chesney, Lieut.-Col. R.E.         | John W. Judd, F.G.S.                                 |
| William Chimmo, Capt. R.N.               | William Carmichael M'Intosh,<br>M.D., F.L.S.         |
| Prof. James Henry Cotterill, M.A.        | Robert M'Lachlan, F.L.S.                             |
| Rev. William Henry Dallinger.            | Richard Henry Major, Sec. R.G.S.                     |
| Herbert Davies, M.D.                     | Prof. John William Mallet, Ph.D.                     |
| Prof. James Dewar, M.A.                  | Henry B. Medlicott, M.A., F.G.S.                     |
| Sir Thomas Fairbairn, Bart.              | Henry Nottidge Moseley, M.A.                         |
| Sir Joseph Fayrer, M.D., K.C.S.I.        | William Donald Napier, M.R.C.S.                      |
| Rev. Norman Macleod Ferrers,<br>M.A.     | Prof. Henry Alleyne Nicholson,<br>M.D., Ph.D., D.Sc. |
| George Fleming, M.R.C.V.S.               | Richard Norris, M.D.                                 |
| Thomas Richard Fraser, M.D.,<br>F.R.S.E. |                                                      |
| William Galloway.                        |                                                      |

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|----------------------------------------------|--------------------------------------------|
| Thomas Bevill Peacock, M.D.,<br>F.R.C.S.     | Samuel Sharp, F.G.S., F.S.A.               |
| William Overend Priestley, M.D.,<br>F.R.C.P. | John Spiller, F.C.S.                       |
| Charles Bland Radcliffe, M.D.,<br>F.R.C.P.   | Hermann Sprengel, Ph.D.                    |
| Prof. Osborne Reynolds, M.A., C.E.           | George James Symons, Sec. M.S.             |
| Samuel Roberts, M.A.                         | Prof. James Thomson, M.A., LL.D.,<br>D.Sc. |
| William Roberts, B.A., M.D.                  | Charles S. Tomes, M.A.                     |
| George F. Rodwell, F.R.A.S.,<br>F.C.S.       | Edwin T. Truman, M.R.C.S.                  |
| George John Romanes, M.A.                    | Prof. William Turner, M.B.,<br>M.R.C.S.    |
| Sir Sidney Smith Saunders, C.M.G.            | Thomas Lord Walsingham.                    |
| Edward A. Schäfer, M.R.C.S.                  | Benjamin Williamson, M.A.                  |
| Michael Scott, M.Inst.C.E.                   | Prof. John Wilson, F.R.S.E., F.G.S.        |
|                                              | Baron Henry de Worms, F.R.A.S.             |

The following Papers were read:—

- I. "Note on the Electrolytic Conduction of some Organic Bodies." By J. H. GLADSTONE, Ph.D., F.R.S., Fullerian Professor of Chemistry in the Royal Institution, and ALFRED TRIBE, F.C.S., Lecturer on Chemistry in Dulwich College. Received January 27, 1877.

During our early researches\* on the copper-zinc couple it naturally occurred to us that we were employing a special means of electrolysis acting at insensible distances; but the first organic substances which we succeeded in decomposing by means of this agent were such as are usually considered non-electrolytic—for instance, iodide of ethyl; and we obtained the remarkable result that when some of these were mixed with alcohol they were much more readily decomposed, although pure alcohol itself is not attacked by the couple of dissimilar metals. From time to time we experimented with external batteries of 10 or 50 cells of Grove, in order to obtain some direct evidence of the electrolyzability of these compounds in the ordinary way, but with only negative results. On the 26th of April, 1875, however, we made a series of experiments, employing 100 Grove's cells, and obtained results which we did not pursue further at the time, but which we think interesting, especially in connexion with the experiments on other but similar bodies which Dr. Bleekrode has lately communicated to the Royal Society, and a short notice of which appears in the last Number of its 'Proceedings.'

We used for the experiments a glass tube, about 5 millims. diameter, closed at one end, into which were fused two platinum wires, about

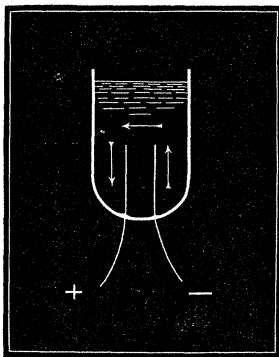
\* Proc. Roy. Soc. 1872, p. 218. Journ. Chem. Soc. 1873, pp. 445, 678, 961; 1874, pp. 208, 406, 410, 615; 1875, p. 508.

1 millim. apart. The liquids were placed in this tube, and the wires connected with the terminal wires of the battery, an ordinary astatic galvanometer being placed in the circuit. The results obtained are as follows:—

*Ethyl Iodide.*—Nil.

*Alcohol.*—On making contact the galvanometer-needle showed a deflection of  $20^\circ$ , and a slight commotion of the liquid was observable. The alcohol gradually warmed up until it boiled, the deflection of the needle increasing the whole time. Gas was apparently given off in minute quantity from the negative electrode; but it was difficult to be certain of this.

*Equal volumes of Alcohol and Ethyl Iodide.*—There was a deflection of  $30^\circ$  on making contact, gradually rising. Great commotion ensued, the liquid rapidly circulating round the poles, as in the annexed diagram, accompanied by a browning of the liquid. Not certain about the evolution of gas—apparently a few minute bubbles from the positive pole. The liquid boiled in about 4 minutes, the deflection being then  $60^\circ$ .



*Ethyl Bromide.*—Nil.

*Equal volumes of Alcohol and Ethyl Bromide.*—Violent commotion on making contact, the galvanometer being deflected to the stops. The liquid quickly boiled. Gas apparently given off from the negative electrode.

*Chloroform.*—Nil.

*Equal volumes of Alcohol and Chloroform.*—Violent commotion. Deflection to stops. The mixture very quickly boiled.

*Ethyl Acetate, Propylene Bromide, Amyl and Isobutyl Iodides* gave negative results. When mixed with equal volumes of alcohol they behave similarly to the mixtures referred to above.

Our results, preliminary as we considered them to be, show that the iodides of ethyl, isobutyl, and amyl, the bromides of ethyl and propylene, the acetate of ethyl, and chloroform are practically non-conductors to a battery-power of 100 cells Grove, and that alcohol is to some extent

traversed by the current. They show also that when these liquid non-conductors are mixed with the feeble conductor alcohol, the conductivity of the mixture is greater than that of alcohol alone, which offers at least a partial clue to the readiness with which such mixtures are decomposed by the copper-zinc couple.

The very considerable development of heat in these liquids, which conduct the electric current with great difficulty, is a circumstance worthy of notice. In these cases it is evident that it does not result from any chemical change, because the decomposition, if any thing at all, is utterly insignificant in amount.

## II. "On the Protrusion of Protoplasmic Filaments from the Glandular Hairs of the Common Teasel (*Dipsacus sylvestris*)."

By FRANCIS DARWIN, M.B. Communicated by CHARLES DARWIN, F.R.S. Received January 30, 1877.

(Abstract.)

The protoplasmic structures described in the following communication are connected with the glandular hairs or trichomes found on both surfaces of the leaf of the common teasel (*Dipsacus sylvestris*). The trichomes are of two kinds, differing in a marked manner in shape. The form of gland from which alone the protoplasmic filaments issue is shown in the diagram. The gland consists of a multicellular pear-shaped head, supported on a cylindrical unicellular stalk which rests on a projecting epidermic cell. The whole structure projects about  $\frac{1}{10}$  of a millimetre ( $\frac{1}{250}$  inch) above the surface of the leaf.

The filaments issue from inside the gland-cells, reaching the surrounding medium by passing through the external cell-wall of the gland. The point where protrusion takes place is on the summit of the gland, and usually at the point of junction of several radiating cells at the centre of its dome-like surface. The act of protrusion is rapidly effected; a previously naked gland may be seen to send forth a minute thread of trembling protoplasm, projecting from its summit freely into the surrounding water. The filament grows by clearly visible increments, and may ultimately attain the length of nearly one millimetre. The filaments appear to pass through the substance of the external cell-wall of the glands, as no apertures to allow of their passage have been observed.

Under normal circumstances the filament presents the appearance of a delicate and elongated thread slightly clubbed at its free end, and animated by the perpetual tremble of Brownian movement. The distal end of the filament is often attached to the gland, thus forming a loop. Extremely delicate filaments of great length are often seen entangled in elaborate and complex knots, or several filaments may be seen issuing from a single gland.

